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Abstract: BACKGROUND Physician well-being has an impact on productivity and quality of care. Residency training is a particularly stressful period. **OBJECTIVE** To assess the well-being of general internal medicine (GIM) residents and its association with personal and work-related factors. **METHODS** We conducted an anonymous electronic survey among GIM residents from 13 Swiss teaching hospitals. We explored the association between a reduced well-being (5 points based on the Physician Well-Being Index [PWBI]) and personal and work-related factors using multivariable mixed-effects logistic regression. **RESULTS** The response rate was 54% (472/880). Overall, 19% of residents had a reduced well-being, 60% felt burned out (emotional exhaustion), 47% were worried that their work was hardening them emotionally (depersonalisation), and 21% had career choice regret. Age (odds ratio [OR] 1.19, 95% confidence interval [CI] 1.05–1.34), working hours per week (OR 1.04 per hour, 95% CI 1.01–1.07) and <2.5 rewarding work hours per day (OR 3.73, 95% CI 2.01–6.92) were associated with reduced well-being. Administrative workload and satisfaction with the electronic medical record were not. We found significant correlations between PWBI score and job satisfaction ($r_s = -0.54$, $p < 0.001$), medical errors ($r_s = 0.18$, $p < 0.001$), suicidal ideation ($r_s = 0.12$, $p = 0.009$) and the intention to leave clinical practice ($r_s = 0.38$, $p < 0.001$). **CONCLUSIONS** Approximately 20% of Swiss GIM residents appear to have a reduced well-being and many show signs of distress or have career choice regret. Having few hours of rewarding work and a high number of working hours were the most important modifiable predictors of reduced well-being. Healthcare organisations have an ethical responsibility to implement interventions to improve physician well-being.

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The well-being of Swiss general internal medicine residents

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Summary

BACKGROUND: Physician well-being has an impact on productivity and quality of care. Residency training is a particularly stressful period.

OBJECTIVE: To assess the well-being of general internal medicine (GIM) residents and its association with personal and work-related factors.

METHODS: We conducted an anonymous electronic survey among GIM residents from 13 Swiss teaching hospitals. We explored the association between a reduced well-being (≥ 5 points based on the Physician Well-Being Index [PWBI]) and personal and work-related factors using multivariable mixed-effects logistic regression.

RESULTS: The response rate was 54% (472/880). Overall, 19% of residents had a reduced well-being, 60% felt burned out (emotional exhaustion), 47% were worried that their work was hardening them emotionally (depersonalisation), and 21% had career choice regret. Age (odds ratio [OR] 1.19, 95% confidence interval [CI] 1.05–1.34), working hours per week (OR 1.04 per hour, 95% CI 1.01–1.07) and <2.5 rewarding work hours per day (OR 3.73, 95% CI 2.01–6.92) were associated with reduced well-being. Administrative workload and satisfaction with the electronic medical record were not. We found significant correlations between PWBI score and job satisfaction ($r_s = -0.54$, $p < 0.001$), medical errors ($r_s = 0.18$, $p < 0.001$), suicidal ideation ($r_s = 0.12$, $p = 0.009$) and the intention to leave clinical practice ($r_s = 0.38$, $p < 0.001$).

CONCLUSIONS: Approximately 20% of Swiss GIM residents appear to have a reduced well-being and many show signs of distress or have career choice regret. Having few hours of rewarding work and a high number of working hours were the most important modifiable predictors of reduced well-being. Healthcare organisations have an ethical responsibility to implement interventions to improve physician well-being.

Keywords: burnout, general internal medicine, job satisfaction, physician, residency, well-being

Introduction

Physician well-being, defined as the optimal interaction of practice efficiency, culture of wellness and personal resilience [1], has become an increasing concern in recent years. In the US, more than 40% of physicians suffer from burnout, and in a national survey of Swiss primary care practitioners about one third presented moderate-degree burnout [2, 3]. Physician well-being is not only associated with empathy and the quality of work relationships [4]; doctors with a reduced well-being may also have a higher prevalence of suicidal ideation [5–7] and motor vehicle accidents [8]. Well-being also has a direct impact on patient care, as it influences workplace productivity and efficiency [9–11], quality of care [12] and patient satisfaction and safety [13–15]. Given its association with patient safety, physician well-being has been recommended as a quality indicator [9].

Development research has demonstrated that the period around 30 years of age, during which physicians usually complete their residency training, is “a time to complete

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early adulthood with pursuit of aspirations, establishment of a niche in society, and raising a family” [16, 17]. However, residency training is also a challenging and stressful period [4]. Intense work demands, limited control and the potential for work-home interference may predispose resident physicians to burnout [18]. Moreover, burnout appears to be particularly prevalent in primary care specialties [19, 20], due to the high administrative workload and patient complexity [21, 22].

To our knowledge, the well-being of general internal medicine (GIM) residents in Switzerland has never been studied. We therefore aimed to evaluate the well-being, as well as associated personal and work-related factors, of Swiss GIM residents in a representative sample. We hypothesised that a substantial proportion of Swiss GIM residents experience a reduced well-being and that this is associated with several personal and work-related factors.

Methods

Study population

We conducted an electronic survey in GIM residents working in the inpatient services at all five Swiss university hospitals and in eight high-volume non-university teaching hospitals in June 2018. These hospitals covered both the German- and French-speaking parts of Switzerland. Swiss GIM residents undergo five years of in- and outpatient training, consisting of three years of mandatory basic training in GIM and two years of elective training in various other medical specialties. We chose these hospitals because they employ a large number of GIM residents, thus increasing the sample size and efficiency of our survey and based on previous collaborative relationships. The head physicians of the 13 GIM divisions were invited to participate in the study, and they all allowed their residents to take the survey. The ethics committee of the canton of Bern waived the need for ethical approval/informed consent because our project was not within the scope of the Swiss Federal Act on Research on Human Beings.

Online survey

We developed an anonymous online survey tool using the REDCap™ software [23]. To reduce the completion time of the survey and to minimise nonresponse and measurement errors, we chose a user-friendly web design and provided German and French language versions of the survey. The survey tool was successfully tested in a pilot study with ten residents from Bern University Hospital, and survey completion was estimated to require four to five minutes. We then obtained the email addresses of all 880 residents working in the 13 participating GIM divisions. We sent an email containing an invitation to participate, a brief description of the survey goals and a web link to the online survey to all 880 residents. Four email reminders (at 7, 14, 21 and 28 days after the initial invitation to participate) were sent out to all participants. To ensure privacy, completed responses could not be linked to individual email addresses. After completion of the survey, residents' email addresses were deleted from the database by a blinded statistician.

The survey included three parts: (1) the collection of personal and work-related characteristics, (2) completion of

the seven-item Physician Well-Being Index (PWBI), and (3) assessment of job satisfaction, recent suicidal ideation, self-reported medical errors and intention to leave clinical practice.

We collected the following personal and work-related characteristics previously described as associated with well-being or burnout: age [24, 25], sex [25, 26], language [27], relationship status [28], partner working as a health-care professional [24, 29], having children [24, 25], years of postgraduate training [24], level of employment in %, average working hours per week [30, 31], number of night shifts per month [32, 33], percentage of time spent on administrative tasks on an average working day [34], perception of doing rewarding/meaningful work (“Please estimate how many hours you spend in a typical day at work on activities that you find personally rewarding”; 0–2.5 hours, 2.5–5 hours, 5–7.5 hours and ≥ 7.5 hours) [35], sense of vocation (“For me, the practice of medicine is a vocation”; 5-point Likert scale from 1 “strongly disagree” to 5 “strongly agree”) [36], willingness to become a physician again (5-point Likert scale from 1 “not at all” to 5 “absolutely”) [37], satisfaction with quality of training (5-point Likert scale from 1 “very dissatisfied” to 5 “very satisfied”) [38], satisfaction with the electronic medical record (EMR) (5-point Likert scale from 1 “very dissatisfied” to 5 “very satisfied”) [39], satisfaction with personal job autonomy (5-point Likert scale from 1 “very dissatisfied” to 5 “very satisfied”) [40], and satisfaction with current income (3-point Likert scale from 1 “dissatisfied” to 3 “completely satisfied”) [41].

We assessed physician well-being using a version of the PWBI that has been specifically adapted for residents [5]. The seven-item questionnaire covers six dimensions, including burnout, depression, stress, fatigue, and mental and physical quality of life during the last month. Respondents are asked to answer seven yes/no questions and received a score from 0–7 (one point for each item answered “yes”), with higher scores indicating a decrease in well-being. Previous versions of the PWBI have shown evidence of content-related and internal structure validity, as well as reliability [42, 43]. A threshold score of ≥ 5 points has a sensitivity of 70% and a specificity of 79% for identifying residents with a low mental quality of life, and increases the likelihood of high fatigue, suicidal ideation and self-perceived medical error [5]. Although the Maslach Burnout Inventory (MBI) is considered the reference standard to measure burnout, its length limits its usability. The PWBI quantifies burnout using single-item measures for the subdomains emotional exhaustion and depersonalisation which are adapted from the full MBI [43]. Single-item measures for emotional exhaustion and depersonalisation have been shown to exhibit strong associations with key outcomes, such as suicidality, and provide meaningful information on burnout [44, 45]. Because no German or French versions of the PWBI were available, we performed a forward-backward translation from the English version of the PWBI into German and French, according to previously published recommendations on the cross-cultural adaptation of self-report measures [46]. First, two independent native German and French speakers performed forward translations from the original English version into German and French. Second, two native English speakers

performed backward translations into English. A committee of three experts reviewed all the translations and reached a consensus on any discrepancies.

We assessed overall job satisfaction using a single-item measure (“Overall, how satisfied are you with your job?”) that was rated on a 5-point Likert scale (from 1 “very dissatisfied” to 5 “very satisfied”) [47]. Although single-item scales for measuring job satisfaction are frequently criticised [48], evidence suggests that there are acceptable corrected mean correlations between single-item and multi-item satisfaction measures, and that single-item measures have a reasonable test-retest reliability [49]. Furthermore, we assessed recent suicidal ideation and perceived medical errors by asking simple yes/no questions (“During the past 12 months, have you had thoughts of taking your own life?”, “Are you concerned you have made any major medical errors in the last three months?”), as has been done previously in other studies [5, 6, 50]. Finally, the residents’ intention to leave clinical practice was assessed similarly to in a previous study [37] by asking “How much do you currently wish you could leave clinical practice?” The answer was rated on a 5-point Likert scale (from 1 “not at all” to 5 “absolutely”).

Statistical analyses

In descriptive analyses, we assessed the personal and work-related characteristics of the respondents, the mean PWBI score, and the proportion of residents with a PWBI score of ≥ 5 , indicating a reduced well-being. In the case of missing values, we used simple imputations using the median value, as has been done previously [51].

We performed multivariable logistic mixed-effects regressions to explore the associations of personal and work-related factors with well-being. The outcome variable was reduced well-being, measured as a binary variable (PWBI score of ≥ 5). Predictor variables included personal (age, sex, language, relationship status, partner working as a healthcare professional and having children) and work-related (years of postgraduate training, level of employment, working hours, administrative workload, rewarding work hours per day, satisfaction with training quality, satisfaction with EMR, satisfaction with personal job autonomy and satisfaction with income) factors. To restrict the number of predictor variables, we decided not to include “night shifts per month” (somewhat redundant with “working hours per week”), “vocation” (not modifiable), and

“willingness to become a physician again” (bidirectional causality) in the model. Due to the correlated nature of data within hospitals, we introduced a random intercept for hospitals in the mixed-effects models.

We used Spearman’s rank correlation coefficient to examine the relationships between the PWBI and job satisfaction, recent suicidal ideation, self-reported medical errors and intention to leave clinical practice. A correlation coefficient from 0 to ± 0.1 indicates a negligible, from ± 0.10 to ± 0.39 a weak, from ± 0.40 to ± 0.69 a moderate, from ± 0.70 to ± 0.89 a strong, and from ± 0.90 to ± 1.00 a very strong correlation [52]. All analyses were done using Stata 14.2 [53].

Results

Survey sample

Overall, 472 residents out of the 880 invited responded to our survey (response rate 54%). Of these, 20 returned a form with no information other than language and demographic variables, and two returned an incomplete PWBI questionnaire, leaving a final sample of 450 residents. The respondents’ characteristics are shown in table 1.

Almost all the participants worked full-time (table 2), with a median of 55 working hours per week and three night shifts per month. Residents indicated that they spend 70% of their time on administrative tasks during an average working day, and 52% spent less than 2.5 hours per day on activities that they find personally rewarding. Twenty-one percent reported that they would rather not or would not at all become physicians again. Only 5% were dissatisfied with the quality of training in their division, but 36% were dissatisfied or very dissatisfied with the hospital EMR. Eighty-nine percent were at least partially satisfied with their personal job autonomy, and 90% with their current income. Nine percent were dissatisfied or very dissatisfied with their job in general.

Overall, 31% of residents were concerned about having made a major medical error during the last three months, and 4% reported suicidal thoughts during the last year (table 3). Thirty-four percent wished to leave clinical practice at least sometimes.

Table 1: Personal characteristics.

Characteristic	Respondents (N = 450) n (%) or median (IQR)
Age, years	30 (28; 31)
Female sex	276 (61)
Language	
German	245 (54)
French	205 (46)
Relationship status	
Single	102 (23)
In a relationship	252 (56)
Married	96 (21)
Partner working as a healthcare professional	167 (37)
Having children	65 (14)

IQR = interquartile range *Two respondents had missing values for “partner working as a healthcare professional”.

Physician Well-Being Index

The mean PWBI score was 2.7 (standard deviation 1.7). Nineteen percent of residents had a score of ≥ 5 points, indicating a reduced well-being (table 4). Sixty percent felt burned out from work (emotional exhaustion) during the last month, 47% were worried that their work was hardening them emotionally (depersonalisation), and 32% reported both symptoms. Fifty-seven percent indicated that they were bothered by emotional problems, and 42% felt that

things they had to do were piling up so high that they could not overcome them.

Association between reduced well-being and personal and work-related factors

After adjustment, the likelihood of a reduced well-being increased by 19% per year of age (odds ratio [OR] 1.19,

Table 2: Work-related factors.

Characteristic	Respondents (N = 450)* n (%) or median (IQR)
Years of postgraduate training, no.	4 (3; 5)
Level of employment	
100%	431 (96)
80%	4 (1)
60%	2 (0)
50%	13 (3)
Working hours per week [†] , no.	55 (50; 60)
Night shifts per month [‡] , no.	3 (0; 5)
Administrative workload [§] , %	70 (60; 80)
Rewarding work hours per day [¶] , no.	
>7.5	5 (1)
5.0–7.5	27 (6)
2.5–5.0	183 (41)
0–2.5	235 (52)
Medicine as a vocation	
Completely agree	76 (17)
Rather agree	166 (37)
Partially agree	129 (29)
Rather disagree	55 (12)
Strongly disagree	22 (5)
Would become physician again	
Absolutely	102 (23)
Probably	158 (35)
Don't know	97 (22)
Rather not	77 (17)
Not at all	16 (4)
Satisfaction with training quality	
Very satisfied	71 (16)
Satisfied	261 (58)
Partially satisfied	94 (21)
Dissatisfied	23 (5)
Very dissatisfied	0 (0)
Satisfaction with electronic medical record	
Very satisfied	37 (8)
Satisfied	120 (27)
Partially satisfied	132 (29)
Dissatisfied	88 (20)
Very dissatisfied	70 (16)
Satisfaction with personal job autonomy	
Very satisfied	29 (6)
Satisfied	236 (52)
Partially satisfied	141 (31)
Dissatisfied	34 (8)
Very dissatisfied	5 (1)
Satisfaction with income	
Completely satisfied	234 (52)
Partially satisfied	47 (10)
Dissatisfied	169 (38)

IQR = interquartile range. * One respondent had missing values for "working hours per week", one for "night shifts per month", two for "medicine as a vocation", one for "satisfaction with training quality", three for "satisfaction with electronic medical record", five for "satisfaction with personal job autonomy". † Average working hours per week during the last three months. ‡ Number of night shifts per month during the last six months. § Percentage of time spent on administrative tasks on an average working day during the last three months. ¶ Hours spent on activities that one finds personally rewarding in a typical day at work.

95% confidence interval [CI] 1.05–1.34) (table 5). Residents with children were significantly less likely to show a reduced well-being than residents without children (OR 0.12, 95% CI 0.03–0.51). The likelihood of a reduced well-being increased by 4% for every additional hour worked per week (OR 1.04, 95% CI 1.01–1.07). Respondents who spent less than 2.5 hours per work day on activities that they find personally rewarding were almost four times more likely to have a reduced well-being (OR 3.73, 95% CI 2.01–6.92). Although residents who had low satisfaction with the quality of their training (OR 1.64, 95% CI 0.56–4.84) and their personal job autonomy (OR 2.24, 95% CI 0.96–5.23) were also somewhat more likely to experience a reduced well-being, and those with a partner working as a healthcare professional (OR 0.54, 95% CI 0.28–1.06) were somewhat less likely to have a reduced well-being, these associations failed to reach statistical significance. Female sex, relationship status, years of post-graduate training, level of employment, administrative workload, satisfaction with the EMR and income were not associated with well-being.

Correlation between the PWBI and practice-related outcomes

We found statistically significant, albeit weak to moderate, correlations between the PWBI and overall job satisfaction (r_s [Spearman's rho] = -0.54 , $p < 0.001$), medical errors ($r_s = 0.18$, $p < 0.001$), suicidal ideation ($r_s = 0.12$, $p = 0.009$) and intention to leave clinical practice ($r_s = 0.38$, $p < 0.001$). Scatterplots of the relationships between the PWBI and practice-related outcomes are shown in the appendix 1.

Discussion

Our survey demonstrates that a substantial proportion of Swiss GIM residents suffer from a reduced well-being or distress, or have career choice regret. Spending few work hours on activities that are perceived as rewarding and number of hours worked were the most significant modifiable predictors of reduced well-being. A reduced level of well-being was correlated with low job satisfaction, the perception of having committed major medical errors, suicidal ideation and the wish to leave clinical practice.

Table 3: Practice-related outcomes.

Characteristic	Respondents (N = 450)* n (%) or median (IQR)
Overall job satisfaction	
Very satisfied	29 (6)
Satisfied	189 (42)
Partially satisfied	183 (41)
Dissatisfied	38 (8)
Very dissatisfied	5 (1)
Major medical errors [†]	139 (31)
Suicidal ideation [‡]	16 (4)
Intention to leave clinical practice	
Not at all	158 (35)
Rather not	141 (31)
Sometimes	108 (24)
Rather yes	30 (7)
Absolutely	12 (3)

IQR = interquartile range * Six respondents had missing values for "overall job satisfaction", one for "major medical errors", one for "suicidal ideation", and one for "intention to leave clinical practice". [†] Being concerned about having made any major medical errors during the last three months. [‡] Having had thoughts of taking one's own life during the last 12 months.

Table 4: Physician Well-Being Index (PWBI).

Items of the PWBI [†]	Endorsing item (N = 450) n (%)
Have you felt burned out from your work?	268 (60)
Have you worried that your work is hardening you emotionally?	211 (47)
Have you often been bothered by feeling down, depressed or hopeless?	135 (30)
Have you fallen asleep while stopped in traffic or driving?	14 (3)
Have you felt that all the things you had to do were piling up so high that you could not overcome them?	191 (42)
Have you been bothered by emotional problems (anxious, depressed, or irritable)?	258 (57)
Has your physical health interfered with your ability to do your daily work at home and/or away from home?	138 (31)
No. of items present	n (%)
0	57 (13)
1	75 (17)
2	80 (18)
3	78 (17)
4	74 (16)
5	67 (15)
6	18 (4)
7	1 (0)

* During the last month

In a survey of US residents from all specialties, 16% had a reduced well-being based on the PWBI, 70% felt burned out, and 65% expressed emotional problems [5]. In surveys of US GIM residents, 15% reported having an impaired quality of life, 43–52% had at least one symptom of burnout, and career choice regret was present in 12% [54, 55]. Swiss residents usually do not have educational debts (a predictor for physician burnout) [54], enjoy a relatively strictly enforced 50-hour work week and, according to our survey, are generally satisfied with their job, including their training, autonomy and income. Yet the prevalence of distress among Swiss GIM residents seems to be at least as high as in the US. A potential explanation for the high prevalence of distress may lie in overly rigid duty hour regulations, which were originally introduced to mitigate resident fatigue and to improve patient safety. However, an average shift length of 10 hours may simply not suffice to accomplish the multiple tasks required in a teaching hospital, and may result in a dense and stressful work schedule, overtime and frequent hand-offs [56–58].

The perception of having few personally rewarding work hours was the strongest predictor of reduced well-being in our analysis. Over half the participants reported having only 0–2.5 personally rewarding work hours a day. Physicians who spend <20% of their work on the activity they find most meaningful are nearly three times more likely to feel burned out [59, 60]. Physicians usually perceive direct patient care as the most meaningful aspect and activity of their work [59]. A recent time-motion study demonstrated that Swiss GIM residents spend an average of only 1.7 hours per day with patients and about 5.2 hours (about half the workday) using computers [61]. Although the burden of administrative tasks and EMR use has been found to contribute to physician dissatisfaction and burnout in prior studies [34, 39, 62–64], we did not find an association between well-being and time spent on administrative tasks or satisfaction with the EMR. However, Swiss residents are usually not involved in coding for billing purposes or documenting quality indicators, and administrative and medical activities are increasingly delegated to non-physician staff. Whether such teamwork-based approaches will bring

residents back to patient bedsides and increase resident satisfaction must be explored further.

Not surprisingly, longer working hours were significantly associated with a reduced well-being in our study and in others [30, 31]. As more restrictive regulation of work hours to below 50 hours per week would likely result in an even more packed work schedule [56–58], we believe that organisational measures, such as the reduction of redundancies and the delegation of administrative tasks to non-physician personnel, should be prioritised over further work hour restrictions [65, 66]. Whether more flexible duty hours would improve well-being is uncertain. Studies from US surgical and internal medicine residency programs have demonstrated that duty hour flexibility may not necessarily translate into better medical education outcomes or resident satisfaction [67, 68]. However, these results may not be generalisable to Swiss residency programs, as Switzerland has much more restrictive duty hour regulations than the US (50 vs 80 hours per week). Therefore, whether more flexible duty hour models could improve Swiss GIM residents' well-being must be examined in future studies.

Although the first year of residency is known to be especially stressful [69], postgraduate training years was not associated with well-being, whereas older residents were more likely to have a reduced well-being in our study. A potential explanation is that lifestyle issues tend to become more important with increasing age [70]. Residents with a partner working as a healthcare professional, and especially those who have children, were less likely to experience distress. In contrast to prior studies demonstrating that having young children and being in a relationship with someone working as a healthcare professional are risk factors for burnout [24, 25, 29], our findings indicate that Swiss GIM residents do not appear to experience a conflict between job and family life.

A low satisfaction with job autonomy tended to increase the risk of reduced well-being in our study. Autonomy, with greater control over the pace and content of clinical work, and the provision of an appropriate learning environment with adequate supervision support are key factors for

Table 5: Associations between personal or work-related factors and reduced well-being*.

Factors	Adjusted† OR (95% CI)	p-value
Age, per year	1.19 (1.05–1.34)	0.005
Female sex	1.60 (0.87–2.95)	0.134
French language	1.30 (0.70–2.38)	0.405
Married or in a relationship	0.84 (0.43–1.63)	0.604
Partner working as a healthcare professional	0.54 (0.28–1.06)	0.073
Having children	0.12 (0.03–0.51)	0.004
Years of postgraduate training, per year	0.94 (0.76–1.17)	0.568
Level of employment, per 10%	0.90 (0.57–1.44)	0.671
Working hours per week, per hour‡	1.04 (1.01–1.07)	0.016
Administrative workload, per 10%§	0.97 (0.80–1.17)	0.759
<2.5 rewarding work hours per day¶	3.73 (2.01–6.92)	<0.001
Low satisfaction with training quality	1.64 (0.56–4.84)	0.370
Low satisfaction with electronic medical record	1.29 (0.72–2.30)	0.392
Low satisfaction with personal job autonomy	2.24 (0.96–5.23)	0.061
Low satisfaction with income**	0.97 (0.43–2.20)	0.936

OR = odds ratio; CI = confidence interval * Reduced well-being was defined as a PWBI score of ≥ 5 . † Adjustments were made for all other variables. ‡ Average working hours per week during the last three months. § Percentage of time spent on administrative tasks on an average working day during the last three months. ¶ Hours spent on activities that one finds personally rewarding in a typical day at work. || Dichotomised as high ("very satisfied", "satisfied" or "partially satisfied") versus low ("dissatisfied" or "very dissatisfied"). ** Dichotomised as high ("completely satisfied" or "partially satisfied") versus low ("dissatisfied").

professional satisfaction [10, 71]. Experiencing sufficient autonomy in their various professional roles as learners and caregivers is important to residents [72]. The personalisation of residency training and the development of GIM *entrustable professional activities* (EPAs), which allow supervisors to make competency-based decisions about the responsibilities that can be entrusted to a resident, may improve that resident's feeling of autonomy and well-being [72–74].

As physician well-being is associated with quality of care, patient safety and physician health [12, 14, 15, 75], hospitals have an ethical obligation to improve physician well-being, for example by providing adequate support structures and staffing levels. Given the costs associated with burnout, turnover, lost revenue due to loss of productivity, and the downstream costs related to patient safety problems, investments in physician well-being may well be cost-effective [76].

Our study has potential limitations. First, the response rate of our survey was 54%. While a higher rate would have been desirable, our response rate compares well with those of previous surveys conducted in GIM residents (8–77%) [4, 5, 54, 77]. As we included a broad range of large Swiss teaching hospitals, we believe that our sample is representative of such hospitals. However, our results may not be generalisable to residency training programs in smaller hospitals. Second, while we explored the associations between a broad range of personal and work-related factors and well-being, we could not examine other potential predictors, such as infrastructural factors (e.g., office space). Third, because of the cross-sectional design of our survey, we could not establish the causality of any relationships. Finally, as in all surveys, our results are subject to self-reporting bias.

Our survey shows a distressed Swiss GIM resident workforce. About 20% of Swiss GIM residents suffer from a reduced well-being or career choice regret, and a substantial proportion show symptoms of emotional exhaustion and depersonalisation. Two potentially modifiable factors, a low number of rewarding work hours and longer working hours, were associated with reduced well-being. Given the human and financial costs of physician distress to both patients and physicians, healthcare organisations have an ethical and professional responsibility to preserve and improve physician well-being, for instance by providing adequate support structures and staffing levels.

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Potential competing interests

The authors declare that they have no conflicts of interest.

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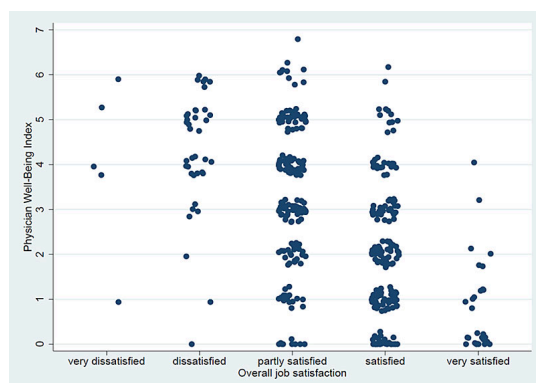
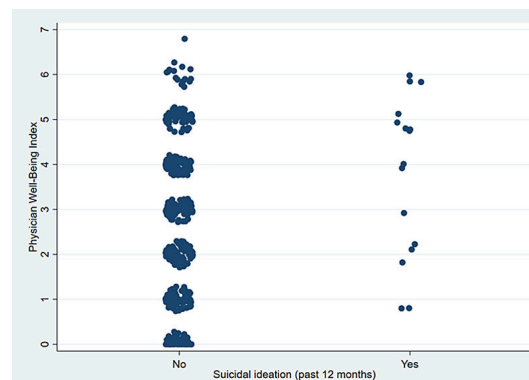
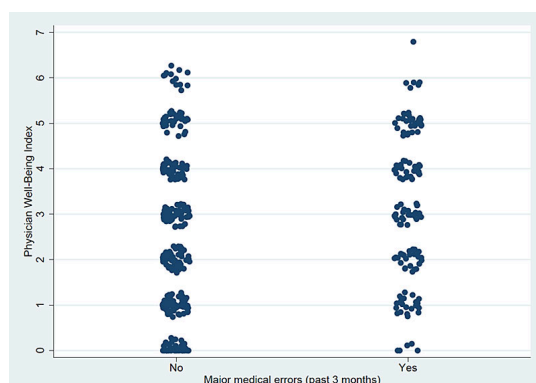
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Appendix 1

Relationship between Physician Well-Being Index score and practice-related outcomes**Panel A:** Overall job satisfaction.**Panel C:** Suicidal ideation.**Panel B:** Major medical errors.**Panel D:** Intention to leave clinical practice.